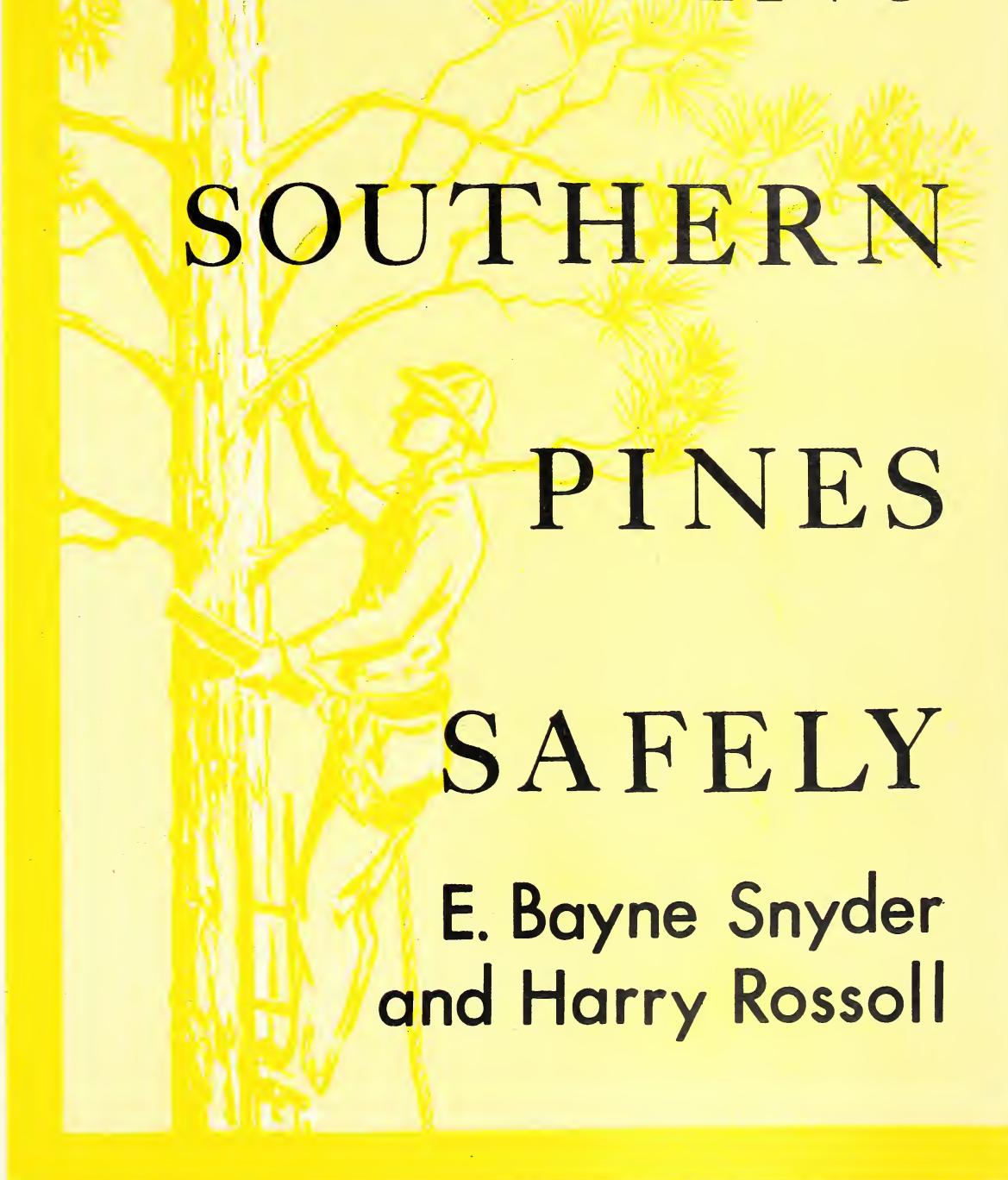


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CLIMBING SOUTHERN PINES SAFELY

E. Bayne Snyder
and Harry Rossoll



SOUTHERN FOREST EXPERIMENT STATION
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Forest Service, U. S. Department of Agriculture

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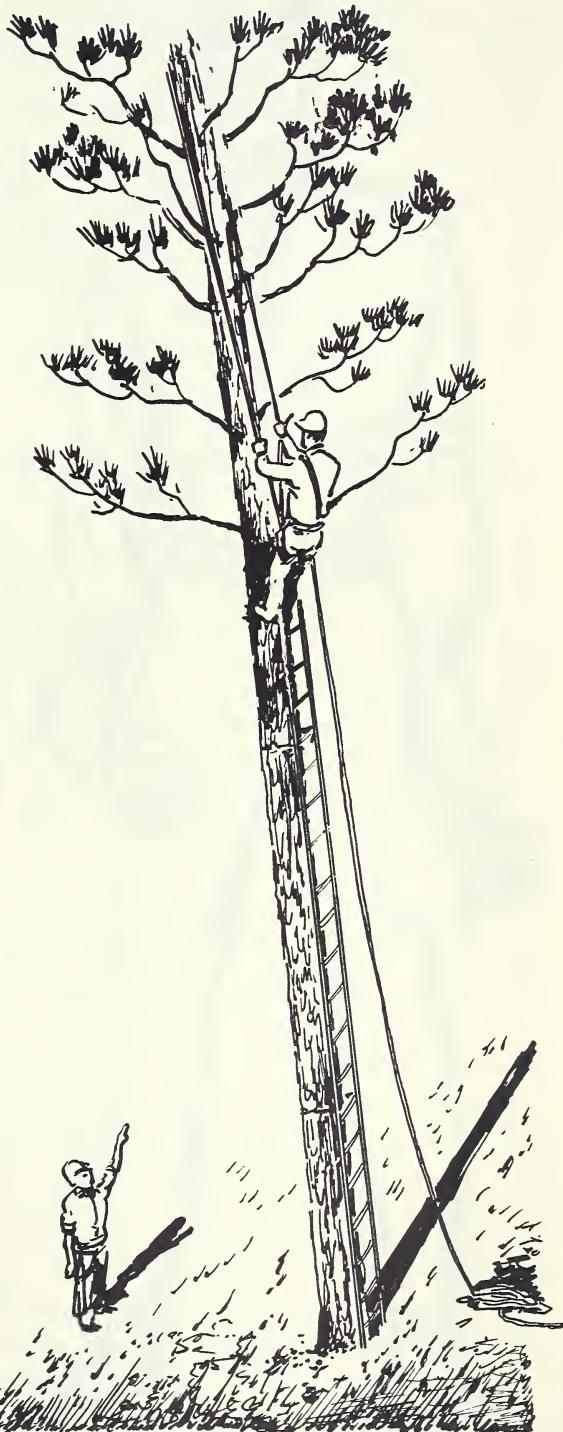
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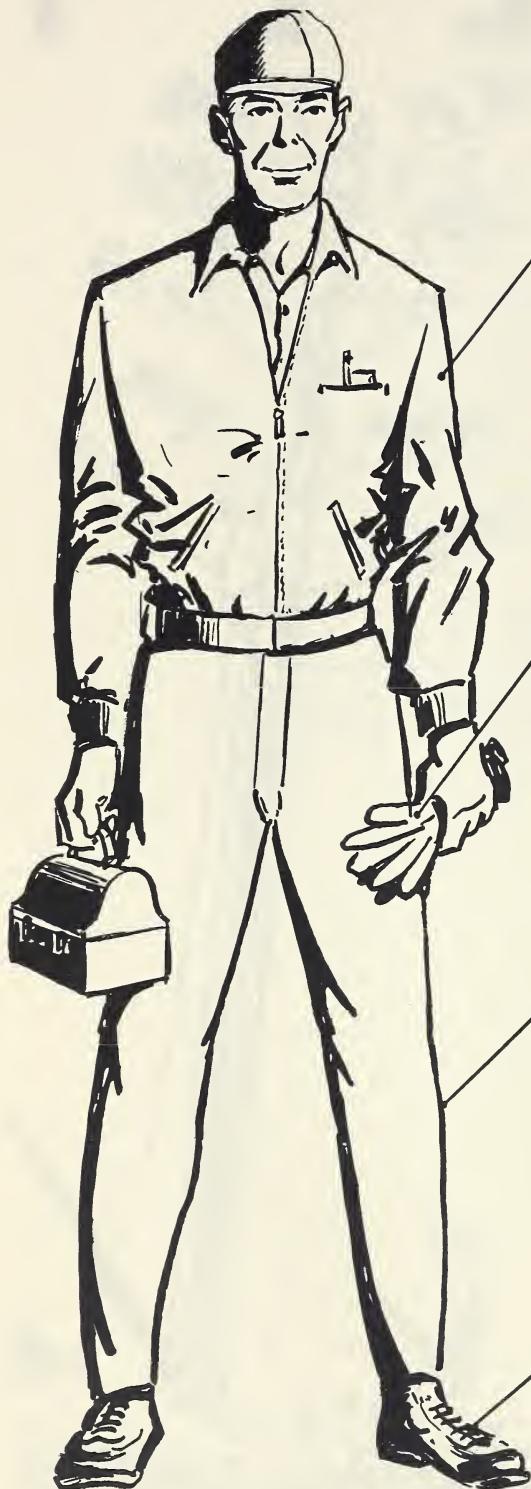
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INTRODUCTION

The tree-climbing practices described in this booklet are recommended to tree breeders and cone collectors for combining safety with efficiency. They apply to climbing with sectional ladders and are subject to revision as experience enlarges. These recommendations cannot prevail against the inherent dangers of tree climbing unless they are studied and practiced. Workers can avoid personal injury and set a good example by never putting undue stress on themselves, the equipment, or the tree. Action should be steady and deliberate instead of rapid, so that there is time to detect and evaluate hidden decay in the tree, and other hazards discussed herein.



PERSONAL CLOTHING



Jackets and shirts must be snug, with smooth cuffs and pockets, so as not to snag or interfere with fastening the safety belt. The jacket must also be short, light, and yet loose enough to permit unhampered movement.

Buckskin driver's gloves with inside seams are advisable for rope climbing and cone collecting.

Pants should be cuffless. If cuffs are worn they should be tacked firmly all the way around.

Shoe soles must be skid-resistant even when wet. They should be intermediate in flexibility for ease of climbing and for preventing foot discomfort when the climber stands on limbs or in limb crotches.

ASSIGNED EQUIPMENT

As a guarantee that climbing equipment is never misused, each man should keep his own under lock and key.



When in use, the safety harness and tree belt should be inspected daily by both the worker and his partner and twice a month by the safety officer or his designate. If visible flaws or more than superficial checks appear in the belt when the grain side is bent double, the equipment must be replaced. Hang the belts away from sharp tools and otherwise treat them with extreme care in storage, transport, and use. Clean them periodically with saddle soap.

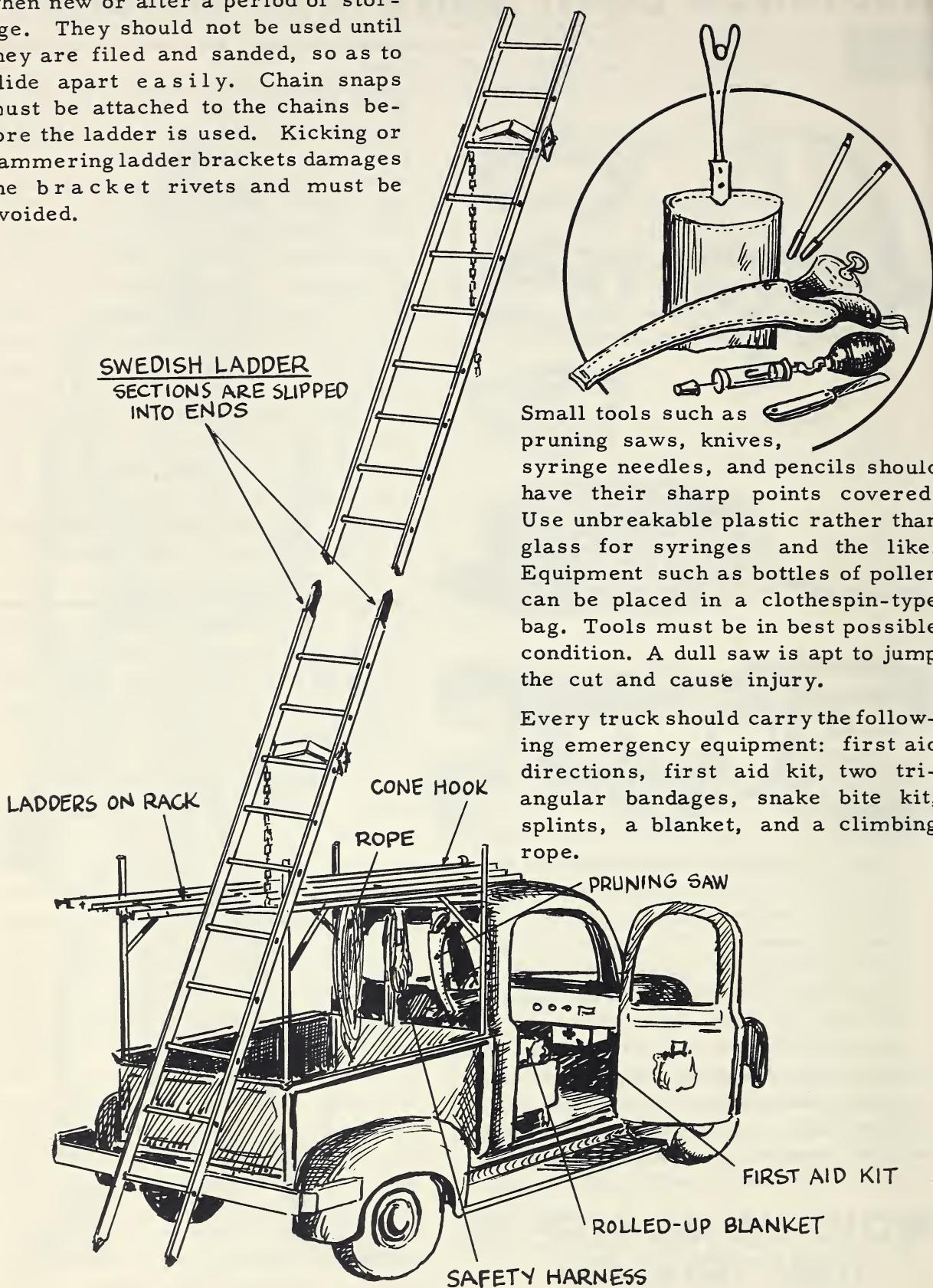
Hard hats or caps must be worn by helpers on the ground and are advised for all cone collectors.

Eye shields should be worn. They will protect the eyes against tools, loose debris, and the saw-like barbs of needles. Some workers object to the feeling of these shields while others claim their prescription glasses fog when the shields are being worn. Antifog chemicals are available. Eyeglasses offer some protection, but do not prevent the eyes from being wounded from the side. Several different types of shields are available and workers should try hard to get accustomed to one of them.

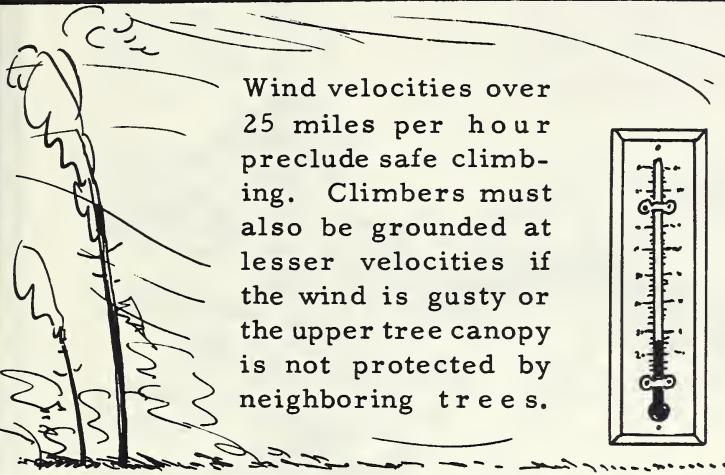
Rope should be of 1/2-inch manila or manila reinforced with nylon. A safe load is no more than one-eighth the minimum breaking strength. Lengths may vary up to 150 feet or more according to the size of the trees. New ropes should be hung in large coils for several months before being used, to minimize effects of original twist. Ropes in use must be inspected daily by both the worker and his partner and twice a month by the safety officer or his designate. Inspection includes separation of strands to see if inside yarns are bright and unbroken. If weaknesses are seen, the rope must be trimmed or discarded. Avoid using the climbing rope for such duties as pulling trucks out of ditches. Testing its strength by subjecting it to strain may weaken it dangerously. Keep it away from fire, acids, sharp tools, etc. If it becomes wet, hang it loosely where there is air circulation. Transport the rope in a coil.

AVOID USING ROPE TO TOW TRUCKS!

Swedish ladders have stiff joints when new or after a period of storage. They should not be used until they are filed and sanded, so as to slide apart easily. Chain snaps must be attached to the chains before the ladder is used. Kicking or hammering ladder brackets damages the bracket rivets and must be avoided.



WEATHER AND TREE CONDITIONS



Wind velocities over 25 miles per hour preclude safe climbing. Climbers must also be grounded at lesser velocities if the wind is gusty or the upper tree canopy is not protected by neighboring trees.



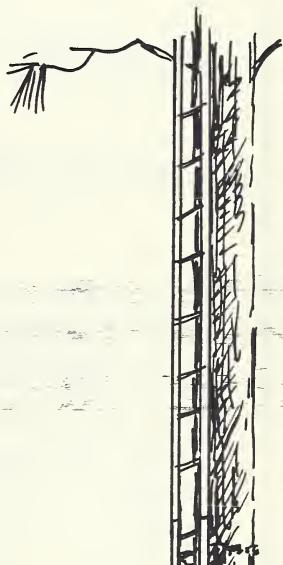
Daylight is mandatory since even simple operations are hazardous and difficult before daylight and after dark. Do not climb in dim light.

Temperatures below 36° render climbing unsafe. Fingers become numb and branches brittle. Climbing should not be undertaken below 40° if there is much wind.

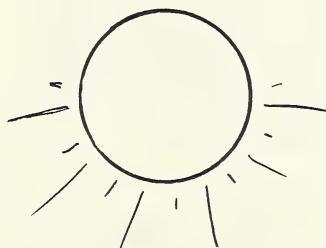


TREE TOP
STEM 3" TO 4" IN
DIAMETER
UNSAFE

A tree top with a stem less than 3 to 4 inches in diameter at the point where the worker attaches his safety belt is likely to be unsafe, depending on the wind and the weight of the climber. Give a wider margin of safety by not going so high--not only for your own sake but for the heavier man who may need to rework the tree in a wind.



Moisture creates slippery surfaces. Shoes may become unexpectedly slippery from wet grass in the early morning. Knots slip if ropes are wet. No climbing should be done in the rain.



WATCH SLIPPERY SHOES FROM WET GRASS



ELECTRICAL STORMS AND POWER LINES



Power lines and electrical storms are especially dangerous. Trees near power or other lines should not be climbed lest the metal ladders and other equipment cause the worker to be electrocuted. Lightning storms move fast and tall breeding trees are frequently hit. If lightning is in the neighborhood, climb down and get away from the tree as quickly as possible.



GET AWAY FROM TREE AS QUICKLY AS POSSIBLE!



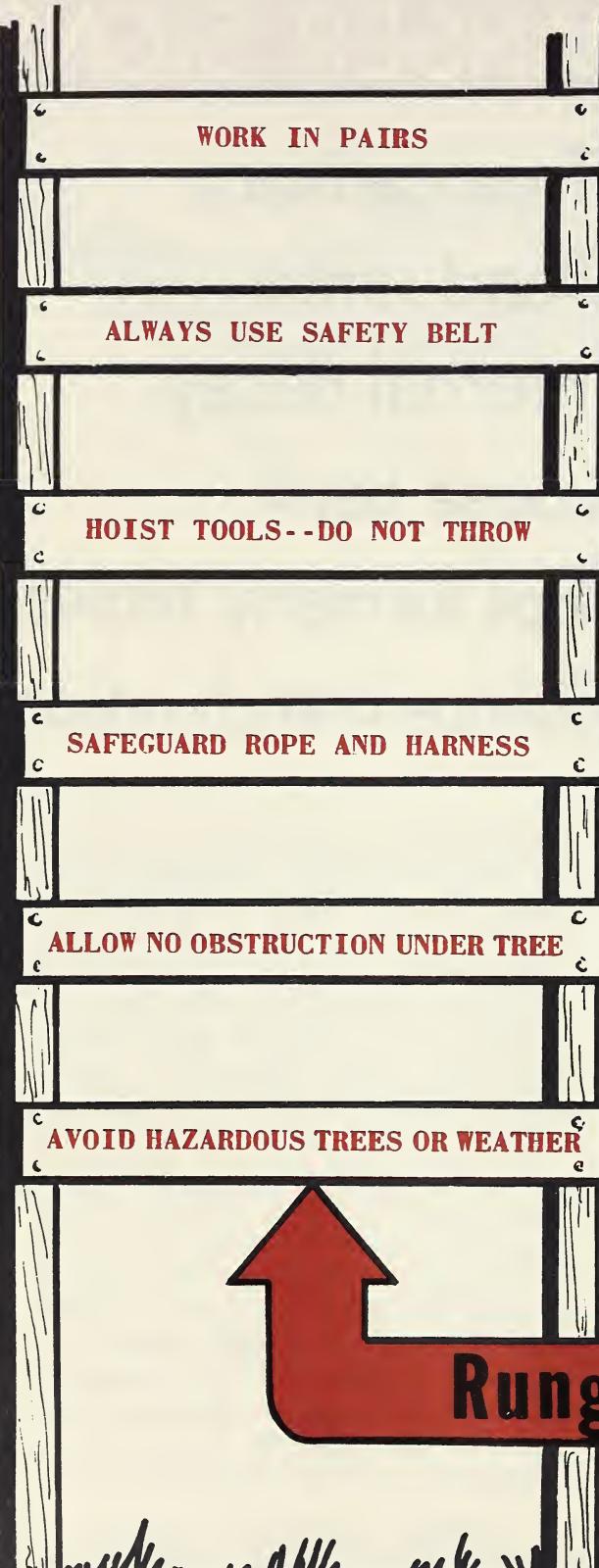
TREE FLAWS

DANGER SIGNS

1. Tree cankers
2. Dead limbs
3. Internal decay
4. Loose bark
5. Tops formerly broken
6. Oblique branch unions

Tree flaws are numerous, but must be detected before climbing is begun. Extreme care must be exercised in examining rust-cankered trees before climbing: the cankers should not exceed one-third the circumference at any one spot. Climbing above high cankers is taboo. Check also for hard-to-see internal decay. Loose bark can make the hand slip from large branches. Care must be taken in trees whose tops have formerly broken out, since the new tops are all the more apt to break. Poor or oblique branch unions and stems with sudden decreases in diameter are similarly prone to breakage. Evaluate the hazards and pass up dangerous trees!

CLIMBING TECHNIQUES

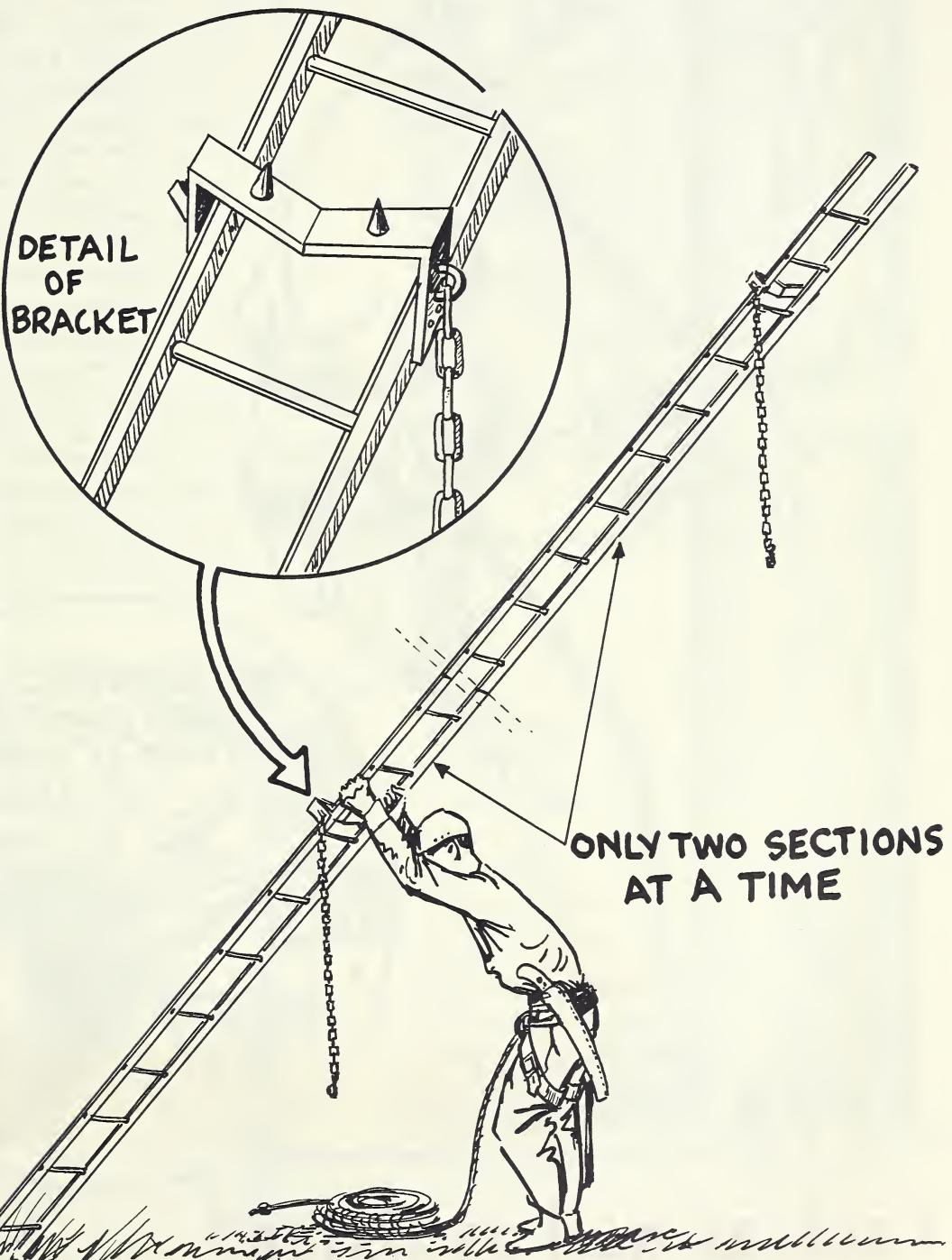


Work in pairs. Two men working near one another can be of mutual assistance in case of accidents.

Remove obstructions, such as heavy brush, from around base of tree. For safety, cut only enough to give room for manipulation and make cuts low so that there are no stubs to fall on. Do not put a fence or other hard objects under the tree. If a tree must be fenced, make the fence movable or place it well beyond the tree crown. Park truck away from the tree, facing the exit road.

Attach equipment, such as extra sections of ladder and cone hooks, to the rope and the rope to the climbing harness. These articles must later be hoisted, not carried or thrown, into the tree. A helper can attach these items to the rope as needed.

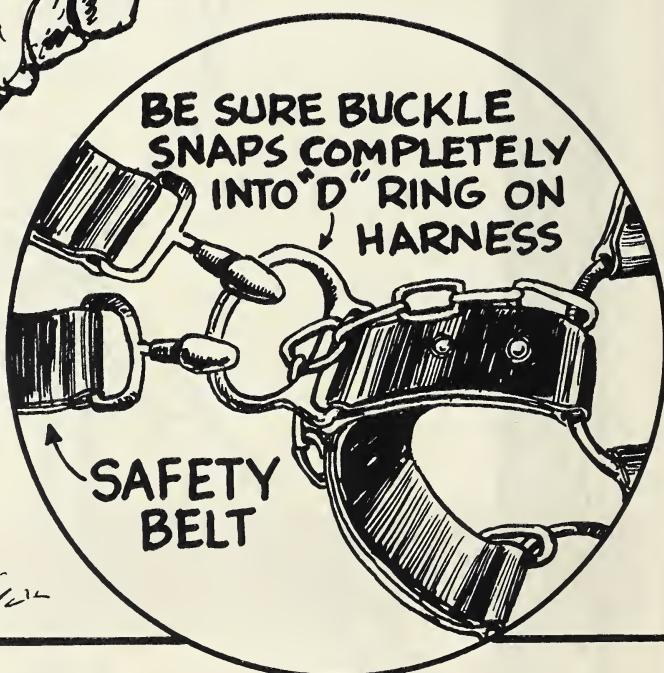
In erecting the ladder, it is safest if only two sections at a time are pushed up from the ground and thereafter only one section hoisted at a time. The top section should extend close to or into the crown and between the limbs. Placing the base of the ladder so that the top section will fit between limbs requires careful study.



ENCIRCLE TREE WITH SAFETY BELT

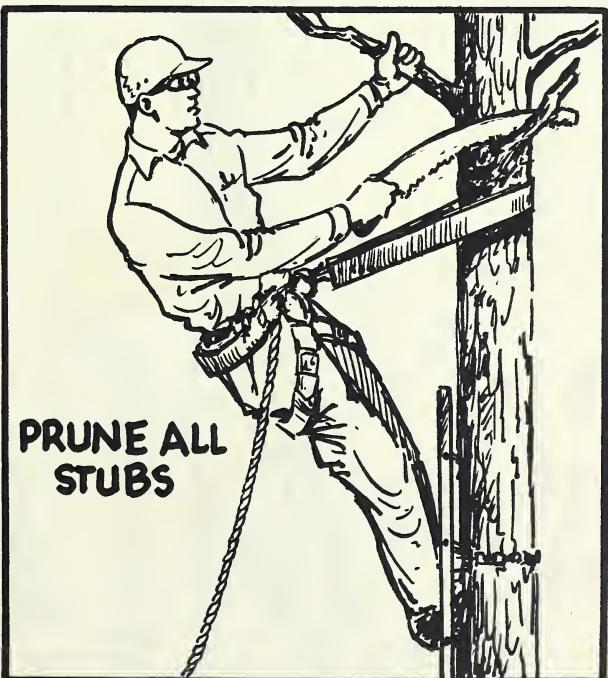
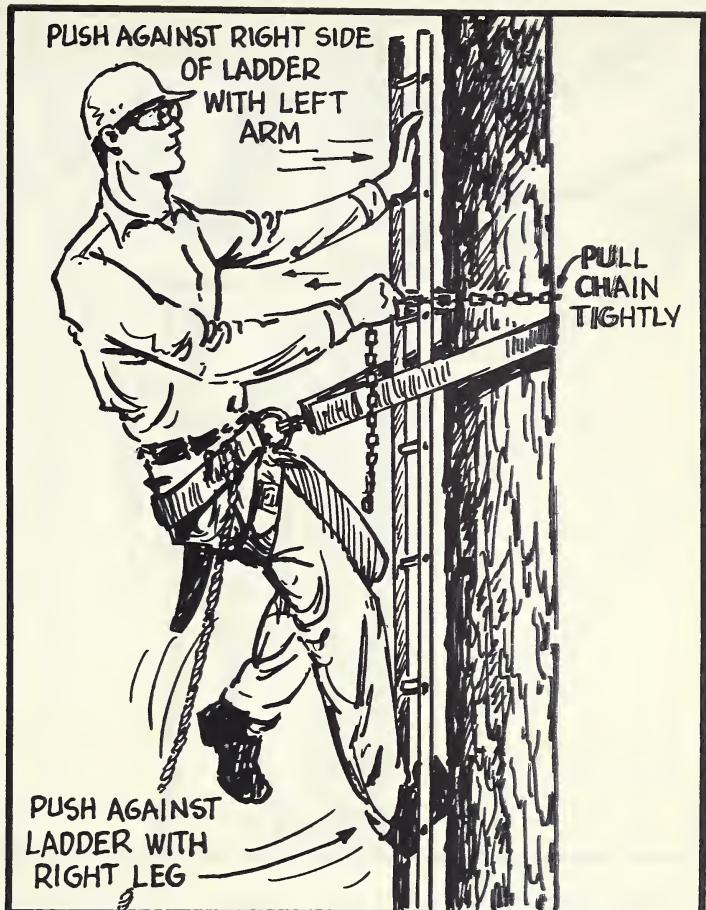


Before leaving the ground, encircle tree with safety belt and adjust belt so it has little slack. The harness is more comfortable if worn around the hips rather than around the waist. When fastening the belt, use your eyes as well as your ears. Climbers have thought their snaps were caught because they heard them "snap," when actually they were not secured. Such experiences can be fatal a hundred feet from the ground! Keep belt fastened for all subsequent operations until you climb into crown.



Look as well as listen!

Fasten the chain of the first ladder section around the tree. It is essential that the chain be taut. This manipulation is sometimes strenuous. Push on the right side of ladder with the left arm and the right foot or knee in a rocking motion while pulling back on the chain to get it in the slot at the correct link. If the slot still comes near the middle of a link, the procedure must be repeated after twisting the chain to shorten it the required amount. As a precaution against the link slipping out of the slot the chain should be knotted around the bracket and itself. The chain's loose end should then be passed between the ladder and the tree and wrapped around the other side of the ladder and bracket to take up the free-end slack, after which it can be snapped on itself. The chain of each ladder section must be fastened as the climber comes to it.



Prune all dead branches and stubs as you proceed up the tree. Cuts should be flush lest belts or clothing catch on the stubs. It may be necessary to stand on the top of one ladder section and prune branches that are preventing erection of the next section, but avoid positions where large pruned limbs can fall on you. The final ladder section should extend close to or into the crown. Stretching from the ladder to the crown and pulling yourself up is both dangerous and fatiguing. Branches directly above the top section should be pruned higher than necessary to put the ladder up since yet more clearance is needed to take the ladder down. Use only a hand saw (equipped with a scabbard) for pruning.



Before transferring to the crown, carefully inspect the limbs. Do not be fooled by dead limbs which are camouflaged by living ones. Cut all dead limbs when you first see them to prevent the possibility of accidentally using them another time. Trusting a dead limb is possibly the greatest single climbing risk.

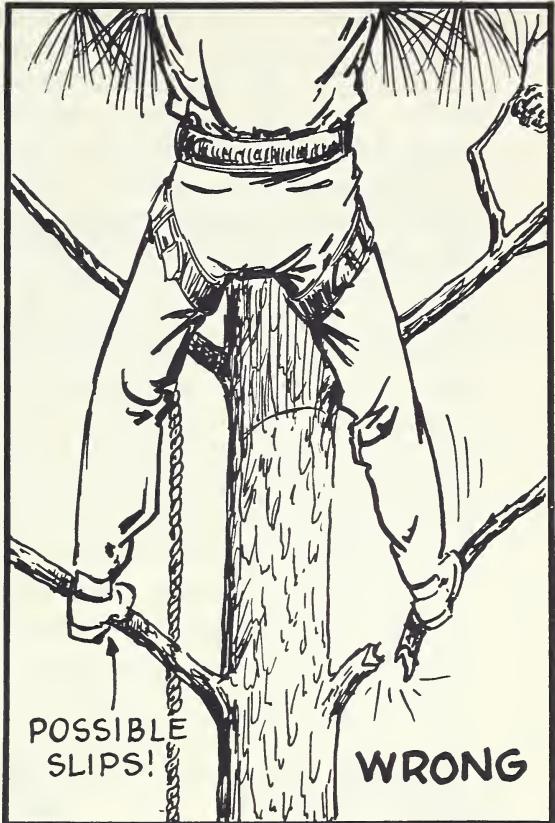
After dead limbs have been removed, brace feet and hold firmly to the ladder or tree with one hand. Unfasten safety belt with other hand, sling end of belt over shoulder, and fasten to the D-ring of the safety harness. Dangling belts are a hazard.

**Trusting a dead limb is
possibly the greatest
single climbing risk !
DON'T DO IT!**

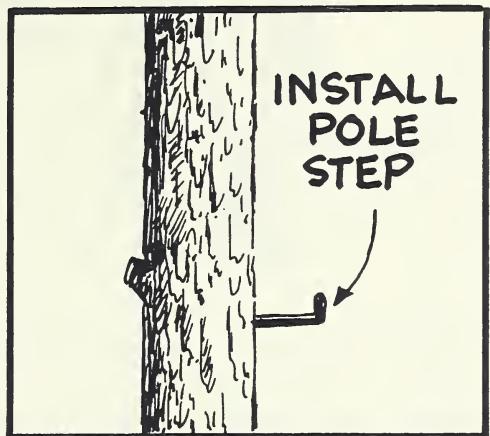




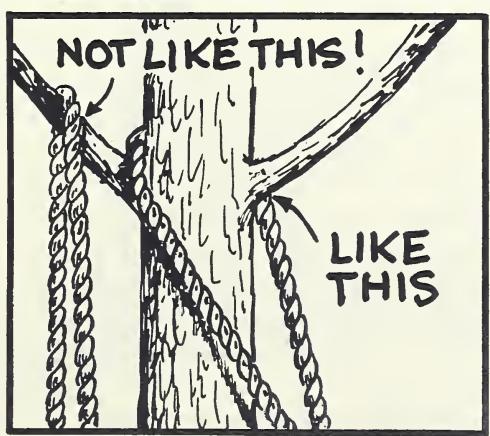
RIGHT



WRONG



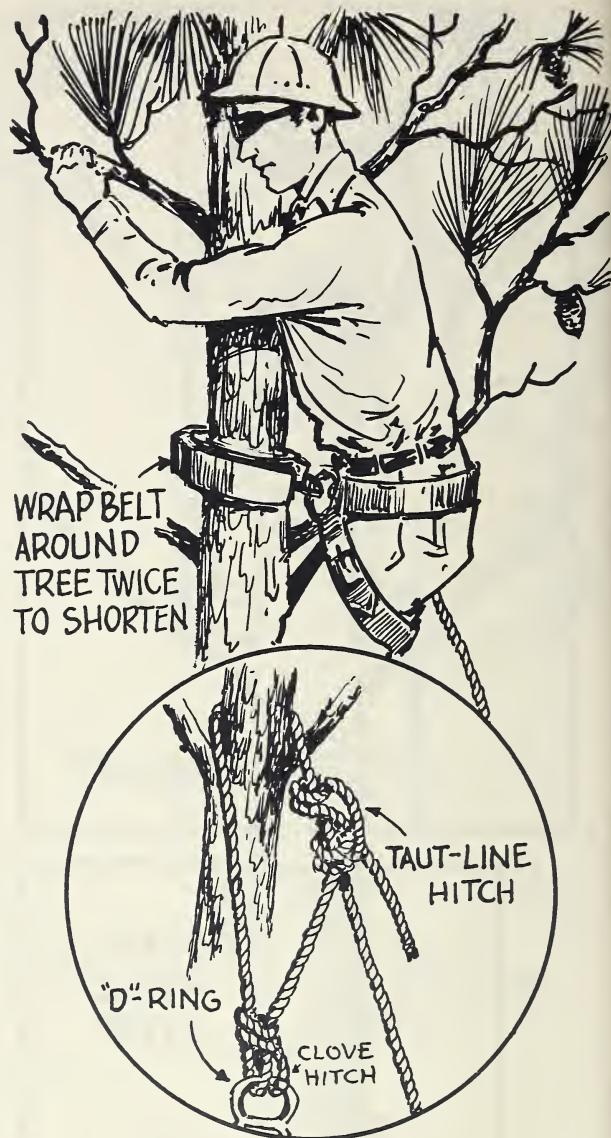
**INSTALL
POLE
STEP**



Climbing in the crown requires continued alertness for dead limbs. Whenever possible, distribute the body weight on several live limbs rather than on a single one. If a long reach is necessary within a crown, toss a rope or belt over a limb above as an aid in pulling yourself up. Better yet, install a pole step in trees to be climbed repeatedly. Step in the crotch rather than out on the limb.

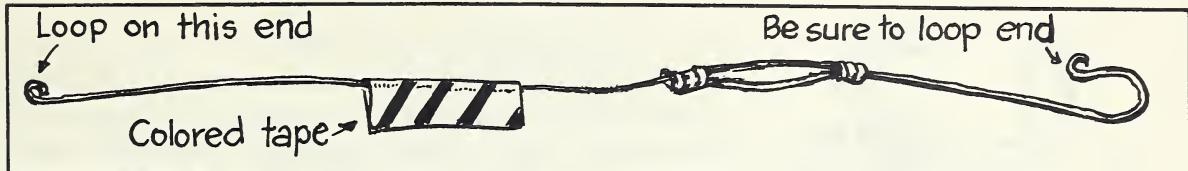
← USE ROPE OR BELT AS AID IN PULLING UP TO HIGHER POSITION

As soon as he has reached his work position the climber must secure himself to the tree with his safety belt. The belt must always be passed around the trunk over a limb on the opposite side of the tree. Usually work is started at the top of the tree. If the stem is thin here, the climber should remain in a vertical position. The belt may be shortened by wrapping it around the thin stem twice. Working with the back to the wind will help alleviate the lean of a thin stem. At a lower work position the sturdier stem will permit extension of the belt, so that the climber can lean out on it from the vertical. Fatigue will then be less because the weight is shared by the harness and the feet. The climber must refasten the belt at each lower work position.



If there are many work positions or if the outside of the crown is hard to reach, a climbing rope is more efficient than the belt. The belt must be used, however, when tying and testing the rope. Use a taut-line hitch with the rope secured to the D-ring of the safety harness with a clove hitch (see the bulletin by Thompson, listed on page 17). Before disconnecting the belt and swinging free, make sure the rope has a figure-eight knot at the ground end, is not entangled, and does not extend into a roadway. Unfasten the hitch only when on the ground or secured with a safety belt.

A hook, fashioned from no. 6 wire and attached to a no. 9 wire about 6 feet long, is used to pull in limbs. Each end should be bent into a very small loop, to minimize injury if a worker is struck. Colored tape on the wire makes the hook easier to see on the ground.



Hitting fellow workers or himself with dropped equipment will be minimized if the climber exercises utmost caution in handling and placing articles in the tree. If he drops an object accidentally, the climber should give a sharp verbal warning. The man on the ground should stand well clear of the tree when he is not actively assisting the climber. A lethal projectile such as a cone-picking pole can ricochet off tree branches for a surprising distance.

Descending after completion of work seems easier than going up but, for that very reason, requires double alertness. The same hazards are there. When dismantling ladders, the climber should secure himself with either the safety belt or a rope with taut-line hitch. If rope is used it must reach all the way to the ground. Remove all ladders and other equipment from trees lest children or others tamper with them. When taking the ladder down remember to grasp the tree trunk rather than the loose ladder!



SUPERVISORY RESPONSIBILITIES



Yearly examinations by a physician are mandatory for all climbers. Workers must be grounded if they have an incapacity, either temporary or persistent, that might endanger them or their helpers. A man who has been working in an office is a risk until he toughens up. While he may rarely be called on to use his maximum strength, emergencies must be anticipated. At first he should be limited to part-time climbing. At no time should a man be driven beyond his endurance.



Red Cross first-aid courses should be required of all climbers.



Safety meetings for all climbers must be held before pollinating and cone-collecting seasons, and at other times deemed necessary by the safety officer. The meetings should review safe procedures and first aid by means of practical demonstrations. It is important that close calls or accidents be analyzed.

New men should climb only when trained in safety and first aid. During their first season they should always be paired with experienced personnel.

SOME SOURCES* OF CLIMBING EQUIPMENT

Wikstrand and Berg cone-picking ladders, Model WI-BE, 10-foot sections. Sandvik Saw and Tool Division, Sandvik Steel, Inc., 47 Warren Street, New York 7, New York.

Saf-I-Flex plastic eyeshield. United States Safety Service Company, Kansas City 6, Missouri.

Model T safety cap. Mine Safety Appliance Company, 1345 Spring St., N.W. Atlanta, Georgia.

Safety strap (2 inches by 5 feet 10 inches, with snaps) and tree harness. A.M. Leonard and Sons, Inc., Piqua, Ohio.

*This list is not exhaustive. Inclusion of a firm or product does not constitute endorsement by the U.S. Forest Service, nor does omission indicate dissatisfaction or discrimination. Cordage, ladders, and safety devices are also obtainable from a number of retail suppliers of forestry equipment.

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U.S. Forest Service. 1958. *Health and safety code*. 363 pp., illus. [Especially sections 5.25, 6.23, 6.62, 7.39, 8.24.]

